TEST REPORT

No. I17Z60835-EMC01

for

TCL Communication Ltd.

LTE / UMTS / GSM mobile phone

Model Name: 5090A

FCC ID: 2ACCJH076

with

Hardware Version: PIO

Software Version: v5F42

Issued Date: 2017-06-27

Note:

The test results in this test report relate only to the devices specified in this report. This report shall not be reproduced except in full without the written approval of CTTL.

Test Laboratory:

FCC 2.948 Listed: No.525429

CTTL,Telecommunication Technology Labs, Academy of Telecommunication Research, MIIT

No. 52, Huayuan North Road, Haidian District, Beijing, P. R. China 100191.

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REPORT HISTORY

Report Number	Revision	Description	Issue Date
I17Z60835-EMC01	Rev.0	1st edition	2017-06-27

CONTENTS

1. Test Laboratory

1.1. Testing Location

Location BDA: CTTL(kangding Road)

Address: No. A18, Kangding Road, Yizhuang, Beijing, P. R. China 100176

CTTL(huayuan North Road)

Address: No. 52, Huayuan North Road, Haidian District, Beijing, P. R. China 100191

1.2. Testing Environment

Normal Temperature: 15-35℃

Relative Humidity: 20-75%

1.3. Project data

Testing Start Date: 2017-06-08

Testing End Date: 2017-06-26

1.4. Signature

张颖

Zhang Ying

(Prepared this test report)

王俊青

Wang Junqing

(Reviewed this test report)

刘宝殿

Liu Baodian

Deputy Director of the laboratory

(Approved this test report)

2. Client Information

2.1. Applicant Information

Company Name:	TCL Communication Ltd.
Address /Post:	5F, C building, No. 232, Liang Jing Road ZhangJiang High-Tech Park, Pudong Area Shanghai, P.R. China. 201203
City:	Shanghai
Postal Code:	201203
Country:	P. R. China
Contact Person:	Gong Zhizhou
Contact Email	zhizhou.gong@tcl.com
Telephone:	0086-21-31363544
Fax:	0086-21-61460602

2.2. Manufacturer Information

Company Name:	TCL Communication Ltd.
Address /Post:	5F, C building, No. 232, Liang Jing Road ZhangJiang High-Tech Park, Pudong Area Shanghai, P.R. China. 201203
City:	Shanghai
Postal Code:	201203
Country:	P. R. China
Contact Person:	Gong Zhizhou
Contact Email	zhizhou.gong@tcl.com
Telephone:	0086-21-31363544
Fax:	0086-21-61460602

3. Equipment Under Test (EUT) and Ancillary Equipment (AE)

3.1. About EUT

Description	LTE / UMTS / GSM mobile phone
Model Name	5090A
FCC ID	2ACCJH076
Extreme vol. Limits	3.5VDC to 4.2VDC (nominal: 3.8VDC)

Note: Components list, please refer to documents of the manufacturer; it is also included in the original test record of CTTL,Telecommunication Technology Labs, Academy of Telecommunication Research, MIIT.

3.2. Internal Identification of EUT used during the test

EUT ID*	SN or IMEI	HW Version	SW Version
EUT3	014952000200978	PIO	v5F42

*EUT ID: is used to identify the test sample in the lab internally.

3.3. Internal Identification of AE used during the test

AE ID*	Description	SN	Remarks
AE1	battery	/	/
AE2	battery	/	/
AE3	Travel charger	/	17TCT-CH-0602
AE4	Travel charger	/	17TCT-CH-0646
AE5	Travel charger	/	17TCT-CH-0615
AE6	USB Cable	/	17TCT-CH-0185
AE7	USB Cable	/	17TCT-CH-0282

AE1

Model	CAC3860001C1
Manufacturer	BYD
Capacitance	/
Nominal voltage	/

AE2

Model	CAC3860002CC
Manufacturer	TCL Hyperpower
Capacitance	
Nominal voltage	

AE3

Model	CBA0061AGAC1
Manufacturer	BYD
Length of cable	/

AE4

Model	CBA0061AGAC2
Manufacturer	Ten Pao
Length of cable	/

AE5

Model	CBA0059AGAC2
Manufacturer	Ten Pao
Length of cable	/

AE6

Model	CDA0000024C2
Manufacturer	henhua
Length of cable	/

AE7

Model	CDA0000024C8
Manufacturer	PUAN
Length of cable	/

*AE ID: is used to identify the test sample in the lab internally.
Note: The USB cables are shielded.

3.4. EUT set-ups

EUT set-up No.	Combination of EUT and AE	Remarks
Set.7	EUT3 + AE3 + AE6	Charger
Set.8	EUT3 + AE4 + AE7	Charger
Set.9	EUT3 + AE5 + AE7	Charger
Set.10	EUT3 + AE6	USB
Set.11	EUT4 + AE7	USB

4. Reference Documents

4.1. Reference Documents for testing

The following documents listed in this section are referred for testing.

Reference	Title	Version
FCC Part 15, Subpart B	Radio frequency devices - Unintentional Radiators	2016 Edition
ANSI C63.4	American National Standard for Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz	2014

Note: The test methods have no deviation with standards.

5. LABORATORY ENVIRONMENT

Semi-anechoic chamber SAC-2 (10 meters×6.7meters×6.1meters) did not exceed following limits along the EMC testing:

Temperature	Min. = 15 ℃, Max. = 30 ℃
Relative humidity	Min. = 35 %, Max. = 60 %
Shielding effectiveness	> 110 dB
Electrical insulation	> 2MΩ
Ground system resistance	< 1Ω
Normalised site attenuation (NSA)	< ±4 dB, 3 m distance, from 30 to 1000 MHz
Site voltage standing-wave ratio (S_{VSWR})	Between 0 and 6 dB, from 1GHz to 18GHz
Uniformity of field strength	Between 0 and 6 dB, from 80 to 3000 MHz

Shielded room did not exceed following limits along the EMC testing:

Temperature	Min. = 15 ℃, Max. = 35 ℃
Relative humidity	Min. = 20 %, Max. = 75 %
Shielding effectiveness	0.014MHz-1MHz, >60dB; 1MHz－1000MHz, >90dB.
Electrical insulation	> 2 MΩ
Ground system resistance	< 4 Ω

6. SUMMARY OF TEST RESULTS

Abbreviations used in this clause:		
Verdict Column	P	Pass
	NA	Not applicable
	F	Fail

Items	Test Name	Clause in FCC rules	Section in this report	Verdict	Test Location
1	Radiated Emission	15.109(a)	B.1	P	**BDA**
2	Conducted Emission	15.107(a)	B.2	P	**huayuan North Road**

7. Test Equipments Utilized

NO.	Description	TYPE	SERIES NUMBER	MANUFACTURE	CAL DUE DATE	CALIBRATION INTERVAL
1	Test Receiver	ESCI 7	100948	R&S	2017-07-05	1 year
2	Test Receiver	ESCI	100766	R&S	2018-04-06	1 year
3	Universal Radio Communication Tester	CMW500	127406	R&S	2018-02-19	1 year
5	LISN	ENV216	101200	R&S	2017-07-10	1 year
6	EMI Antenna	VULB 9163	9163-514	Schwarzbeck	2017-11-24	3 years
7	EMI Antenna	3117	00139065	ETS-Lindgren	2017-09-21	3 years

Test Item	Test Software and Version	Software Vendor	Test operator
Radiated Continuous Emission	EMC32 V9.01	R&S	Yang Fei
Conducted Emission	EMC32 V8.52.0	R&S	Shi Suolan

ANNEX A: MEASUREMENT RESULTS

A.1 Radiated Emission

Reference

FCC: CFR Part 15.109(a).

A.1.1 Method of measurement

The field strength of radiated emissions from the unintentional radiator (charging mode of MS) at distances of 3 meters(for 30MHz-1GHz) and 3 meters (for above 1GHz) is tested. Tested in accordance with the procedures of ANSI C63.4 – 2014, section 8.3.

The EUT was placed on a non-conductive table. The measurement antenna was placed at a distance of 3/10 meters from the EUT. During the tests, the antenna height and the EUT azimuth were varied in order to identify the maximum level of emissions from the EUT. This maximization process was repeated with the EUT positioned in each of its three orthogonal orientations.

A.1.2 EUT Operating Mode:

The MS is operating in the charging mode. During the test MS is connected to a charger in the case of charging mode.

Note：I/O information：Printer – USB, Mouse – PS/2, Keyboard – USB.

A.1.3 Measurement Limit

Frequency range (MHz)	Field strength limit (μV/m)		
	Quasi-peak	Average	Peak
30-88	100		
88-216	150		
216-960	200		
960-1000	500		
>1000		500	5000

Note: the above limit is for 3 meters test distance. 10 meters' limit is got by converting.

A.1.4 Test Condition

Frequency range (MHz)	RBW/VBW	Sweep Time (s)	Detector
30-1000	120kHz (IF Bandwidth)	5	Peak/Quasi-peak
Above 1000	1MHz/1MHz	15	Peak, Average

A.1.5 Measurement Results

A "reference path loss" is established and the A_{Rpl} is the attenuation of “reference path loss”. It includes the antenna factor of receive antenna and the path loss.

The measurement results are obtained as described below:

Result = P_{Mea} + A_{Rpl} = P_{Mea} + G_A + G_{PL}

Where

G_A: Antenna factor of receive antenna

G_{PL}: Path Loss

P_{Mea}: Measurement result on receiver.

Measurement uncertainty (worst case): 30MHz-1GHz：4.86dB, 1GHz-18GHz：5.26dB, *k*=2.

Measurement results for Set.7:

Charging Mode/Average detector

Frequency(MHz)	Result(dBμV/m)	G_{PL} (dB)	G_A (dB/m)	P_{Mea}(dBμV)	Polarity
17802.750	41.31	-23.1	41.0	23.46	V
17811.750	41.28	-23.0	41.0	23.36	H
17807.250	41.20	-23.0	41.0	23.27	H
17808.750	41.20	-23.0	41.0	23.25	V
17813.250	41.19	-23.0	40.9	23.29	V
17800.500	41.16	-23.1	41.0	23.34	H

Charging Mode/Peak detector

Frequency(MHz)	Result(dBμV/m)	G_{PL} (dB)	G_A (dB/m)	P_{Mea}(dBμV)	Polarity
17816.250	52.5	-23.1	40.9	34.63	H
17807.250	52.3	-23.0	41.0	34.36	H
17823.000	52.1	-23.2	40.9	34.34	H
17817.000	51.9	-23.1	40.9	34.07	V
17813.250	51.9	-23.0	40.9	34.01	H
17819.250	51.9	-23.1	40.9	34.07	H

Measurement results for Set.8:

Charging Mode/Average detector

Frequency(MHz)	Result(dBμV/m)	G_{PL} (dB)	G_A (dB/m)	P_{Mea}(dBμV)	Polarity
17803.500	41.49	-23.1	41.0	23.63	H
17806.500	41.43	-23.0	41.0	23.52	H
17810.250	41.32	-23.0	41.0	23.37	V
17815.500	41.31	-23.1	40.9	23.44	V
17811.750	41.27	-23.0	41.0	23.34	V
17820.000	41.22	-23.1	40.9	23.42	V

Charging Mode/Peak detector

Frequency(MHz)	Result(dBμV/m)	G_{PL} (dB)	G_A (dB/m)	P_{Mea}(dBμV)	Polarity
17800.500	53.3	-23.1	41.0	35.49	H
17811.000	52.3	-23.0	41.0	34.37	V
17795.250	52.3	-23.2	41.0	34.52	H
17745.000	52.2	-24.0	41.0	35.24	H
17813.250	52.1	-23.0	40.9	34.22	H
17730.000	52.1	-24.3	41.0	35.40	H

Measurement results for Set.9:

Charging Mode/Average detector

Frequency(MHz)	Result(dBμV/m)	G_{PL} (dB)	G_A (dB/m)	P_{Mea}(dBμV)	Polarity
17806.500	41.40	-23.0	41.0	23.49	H
17802.750	41.34	-23.1	41.0	23.49	V
17805.750	41.29	-23.1	41.0	23.39	V
17799.750	41.26	-23.2	41.0	23.45	V
17811.000	41.22	-23.0	41.0	23.29	H
17815.500	41.16	-23.1	40.9	23.29	H

Charging Mode/Peak detector

Frequency(MHz)	Result(dBμV/m)	G_{PL} (dB)	G_A (dB/m)	P_{Mea}(dBμV)	Polarity
17812.500	53.7	-23.0	40.9	35.78	H
17798.250	53.0	-23.2	41.0	35.16	H
17768.250	52.9	-23.7	41.0	35.55	V
17829.750	52.6	-23.3	40.9	34.90	V
17805.750	52.6	-23.1	41.0	34.66	V
17794.500	52.3	-23.2	41.0	34.55	H

Measurement results for Set.10:

USB Mode/Average detector

Frequency(MHz)	Result(dBμV/m)	G_{PL} (dB)	G_A (dB/m)	P_{Mea}(dBμV)	Polarity
17803.500	41.37	-23.1	41.0	23.50	H
17809.500	41.23	-23.0	41.0	23.27	H
17808.750	41.14	-23.0	41.0	23.19	H
17823.750	41.13	-23.2	40.9	23.37	H
17806.500	41.12	-23.0	41.0	23.20	H
5877.752	38.39	-32.2	35.1	35.45	V

USB Mode/Peak detector

Frequency(MHz)	Result(dBμV/m)	G_{PL} (dB)	G_A (dB/m)	P_{Mea}(dBμV)	Polarity
17805.750	53.1	-23.1	41.0	35.16	H
17803.500	52.8	-23.1	41.0	34.96	V
17805.000	52.5	-23.1	41.0	34.58	H
17852.250	52.4	-23.6	40.9	35.03	V
17811.000	52.3	-23.0	41.0	34.34	V
5877.750	45.5	-32.2	35.1	42.57	H

Measurement results for Set.11:

USB Mode/Average detector

Frequency(MHz)	Result(dBμV/m)	G_{PL} (dB)	G_A (dB/m)	P_{Mea}(dBμV)	Polarity
17808.750	41.41	-23.0	41.0	23.46	V
17814.750	41.25	-23.1	40.9	23.37	V
17811.000	41.25	-23.0	41.0	23.31	V
17806.500	41.20	-23.0	41.0	23.29	H
17817.750	41.19	-23.1	40.9	23.35	H
5877.420	38.33	-32.2	35.1	35.39	H

USB Mode/Peak detector

Frequency(MHz)	Result(dBμV/m)	G_{PL} (dB)	G_A (dB/m)	P_{Mea}(dBμV)	Polarity
17802.750	53.4	-23.1	41.0	35.53	H
17847.000	52.3	-23.5	40.9	34.93	V
17840.250	52.2	-23.4	40.9	34.64	H
17829.000	52.0	-23.3	40.9	34.37	V
5877.023	45.3	-32.2	35.1	42.40	V
7790.250	46.8	-31.1	36.0	41.93	H

Sample calculation: Peak detector, 17802.750MHz

Result =P_{Mea} (35.53 dBμV)+ G_A (41.0 dB/m)+ G_{PL}(-23.1dB) =53.4dBμV/m

Charging Mode, Set.7

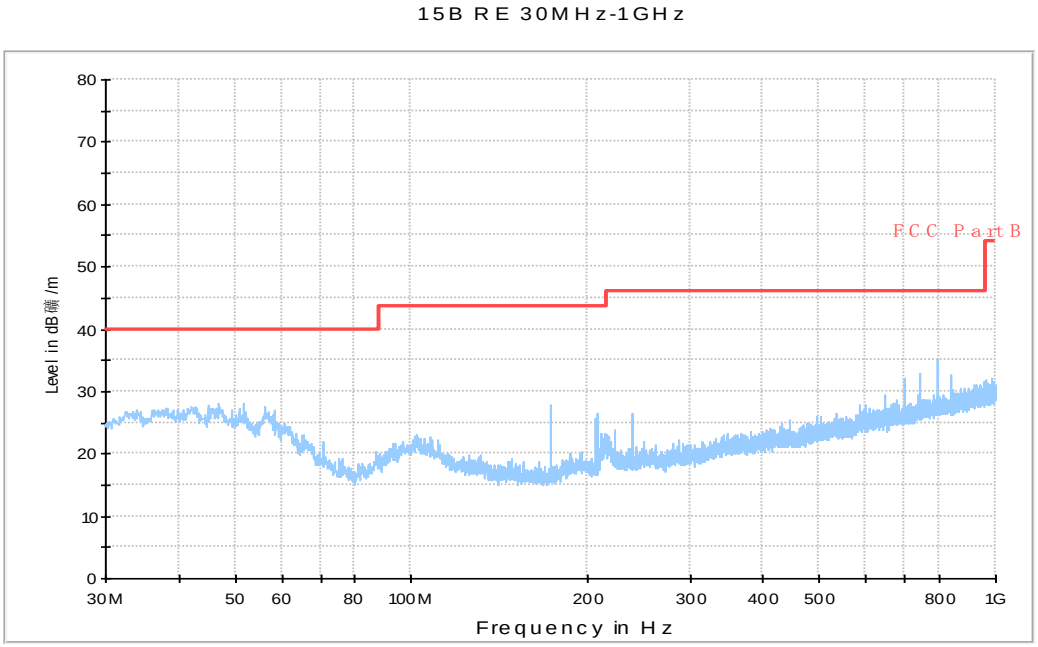

Figure A.1 Radiated Emission from 30MHz to 1GHz

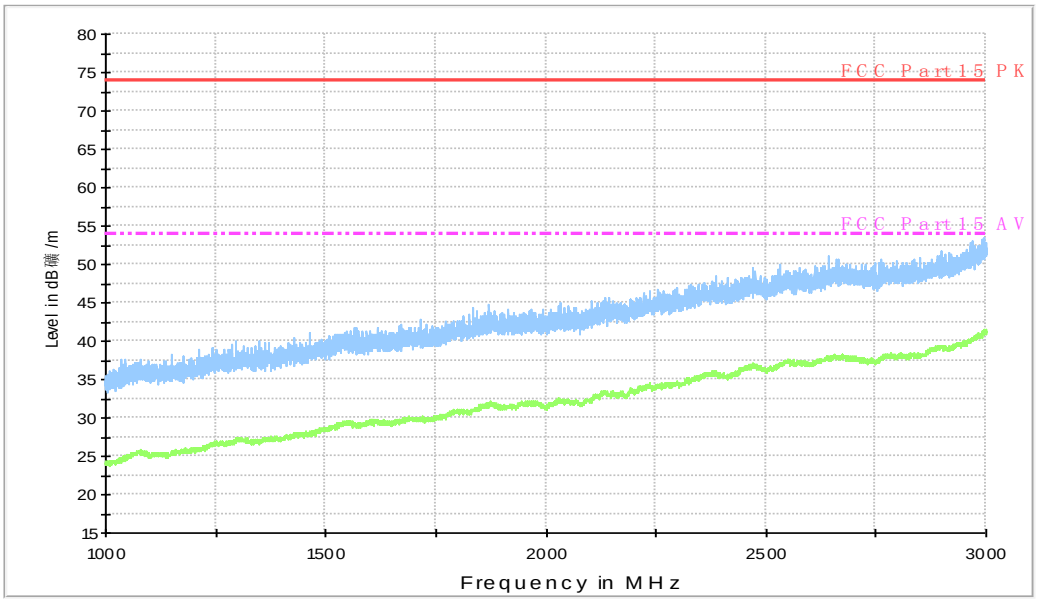

Figure A.2 Radiated Emission from 1GHz to 3GHz

15b RE - 3GHz-18GHz

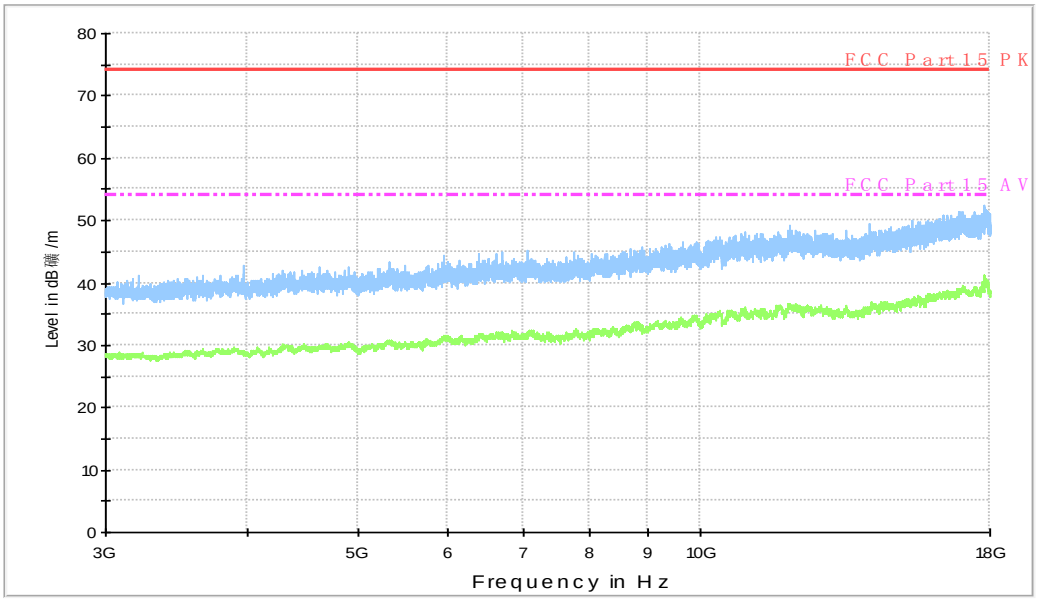

Figure A.3 Radiated Emission from 3GHz to 18GHz

Charging Mode, Set.8

15B RE 30MHz-1GHz

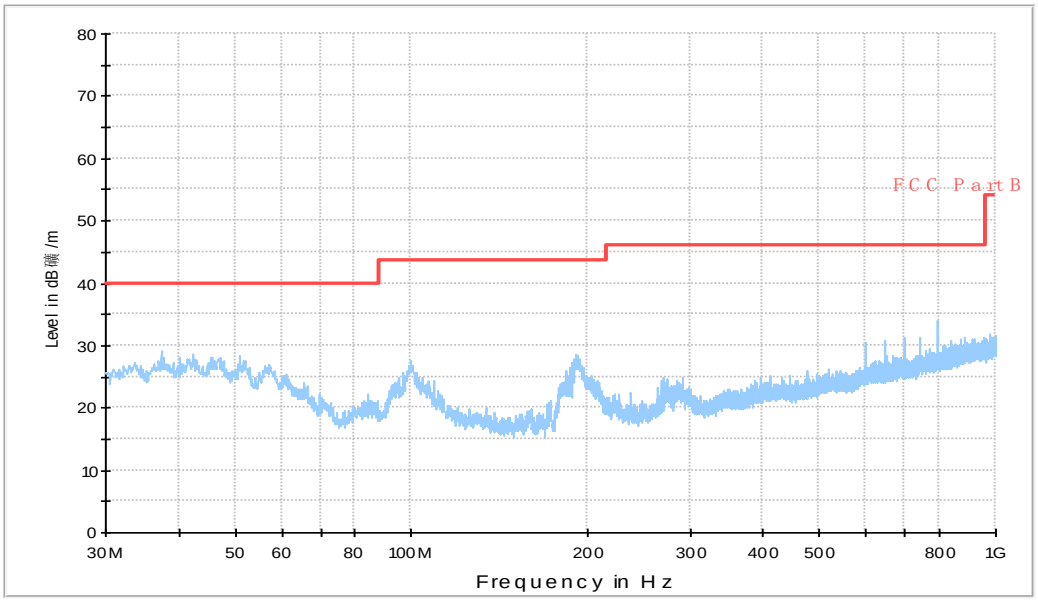

Figure A.4 Radiated Emission from 30MHz to 1GHz

15B RE - 1GHz-3GHz

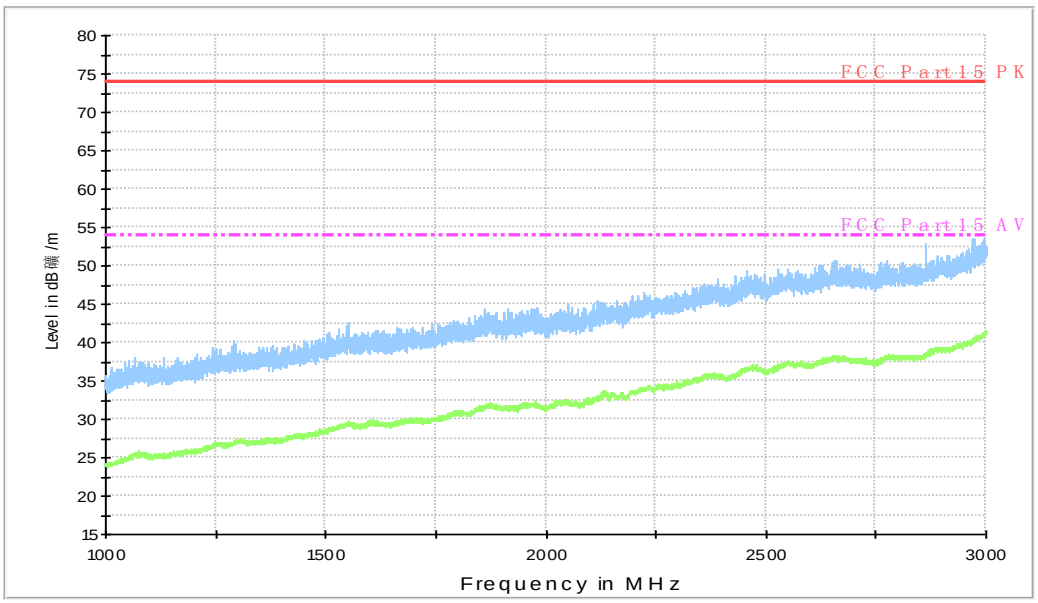

Figure A.5 Radiated Emission from 1GHz to 3GHz

15b RE - 3GHz-18GHz

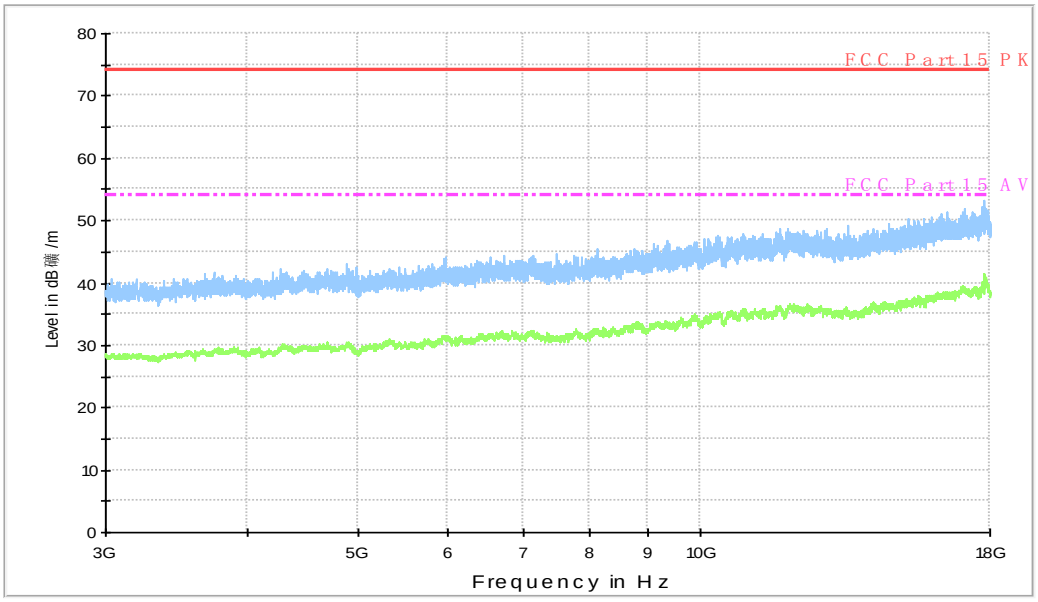

Figure A.6 Radiated Emission from 3GHz to 18GHz

Charging Mode, Set.9

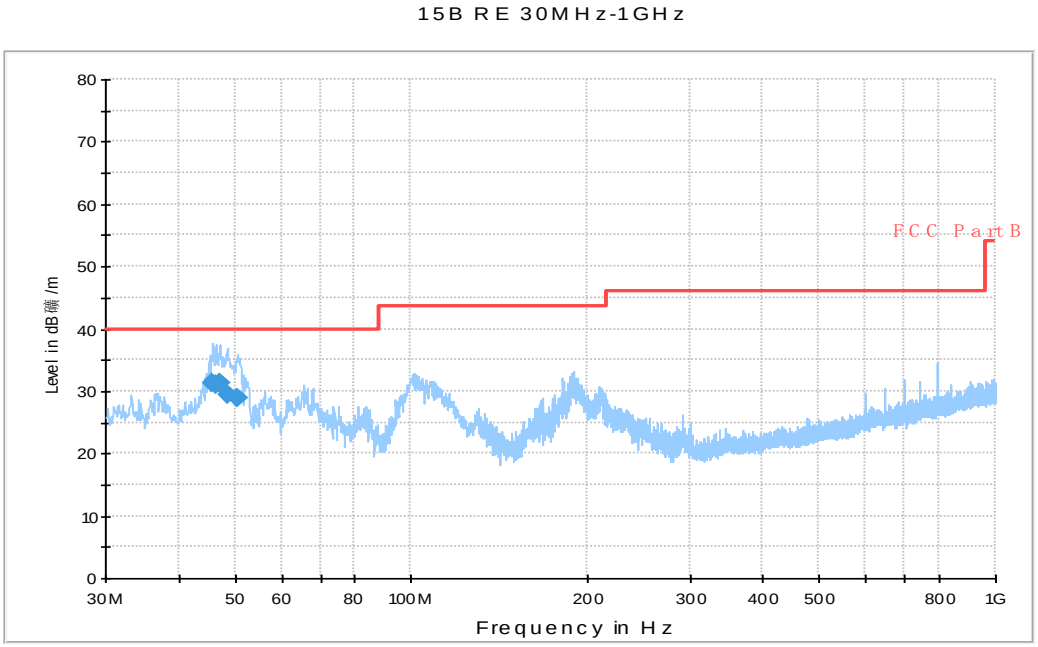

Figure A.7 Radiated Emission from 30MHz to 1GHz

Final Result 1

Frequency (MHz)	QuasiPeak (dBµV/m)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)
45.811000	31.4	100.0	V	48.0	-17.7	8.6	40.0
46.490000	31.0	100.0	V	-42.0	-17.8	9.0	40.0
47.169000	31.4	100.0	V	-42.0	-17.9	8.6	40.0
48.430000	29.4	100.0	V	135.0	-18.1	10.6	40.0
50.467000	29.0	100.0	V	49.0	-18.3	11.0	40.0

15B RE - 1GHz-3GHz

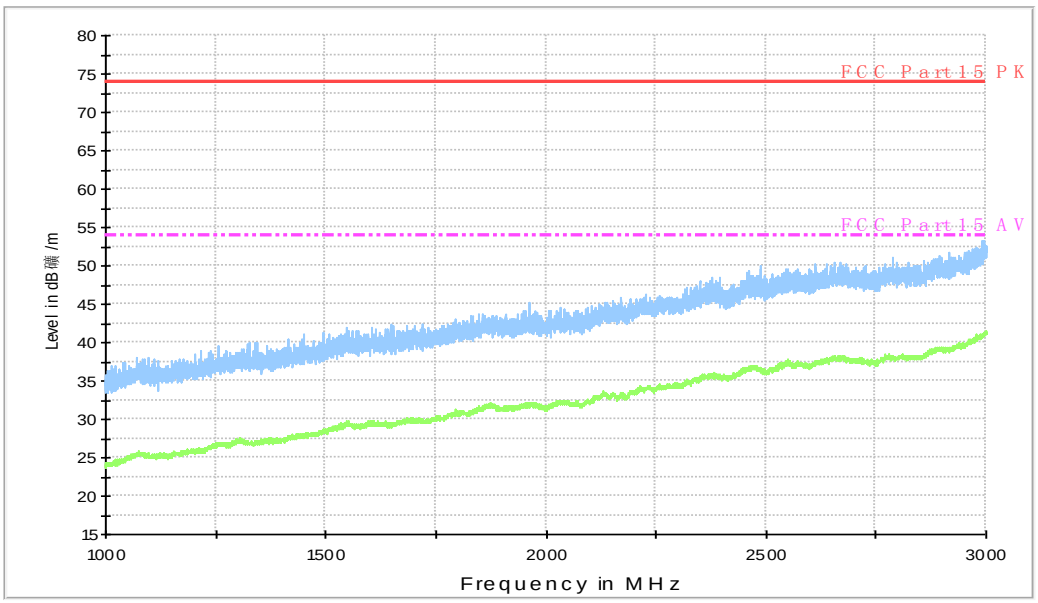

Figure A.8 Radiated Emission from 1GHz to 3GHz

15b RE - 3GHz-18GHz

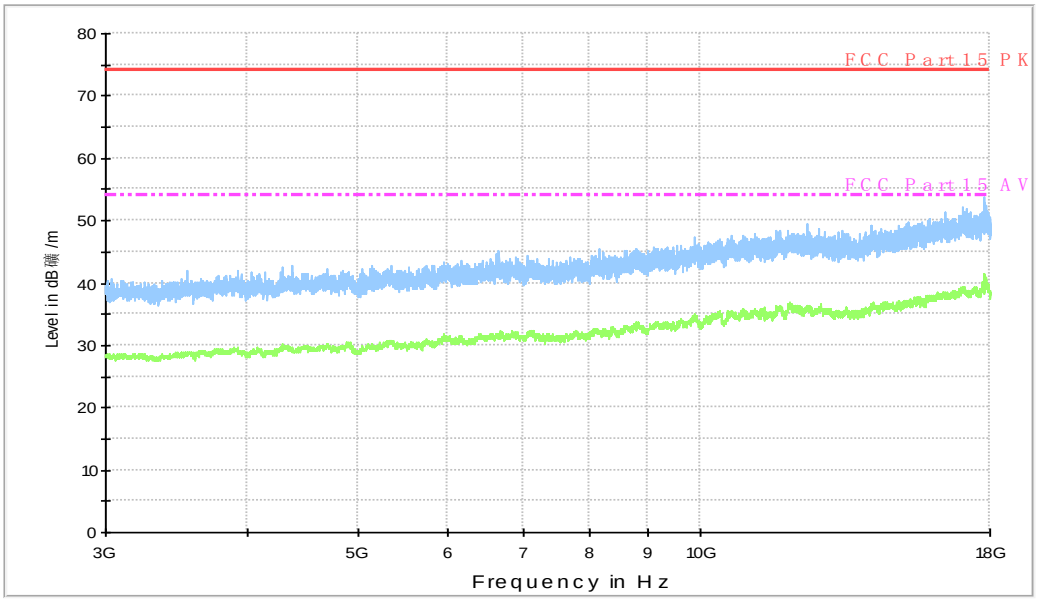

Figure A.9 Radiated Emission from 3GHz to 18GHz

USB Mode, Set.10

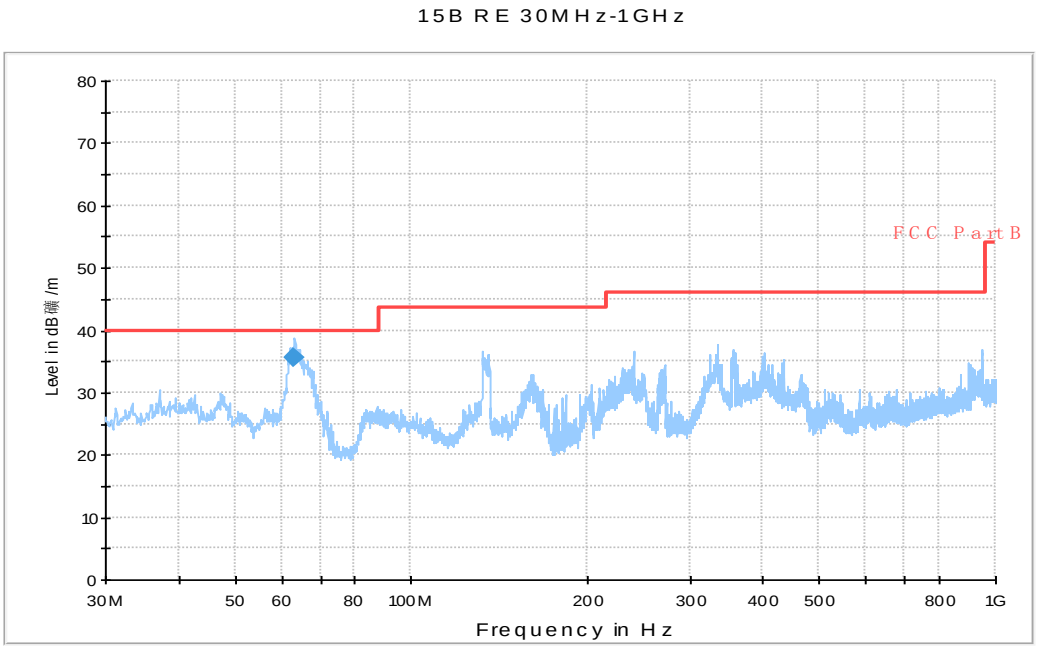

Figure A.10 Radiated Emission from 30MHz to 1GHz

Final Result 1

Frequency (MHz)	QuasiPeak (dBµV/m)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)
63.271000	35.6	100.0	V	287.0	-19.9	4.4	40.0

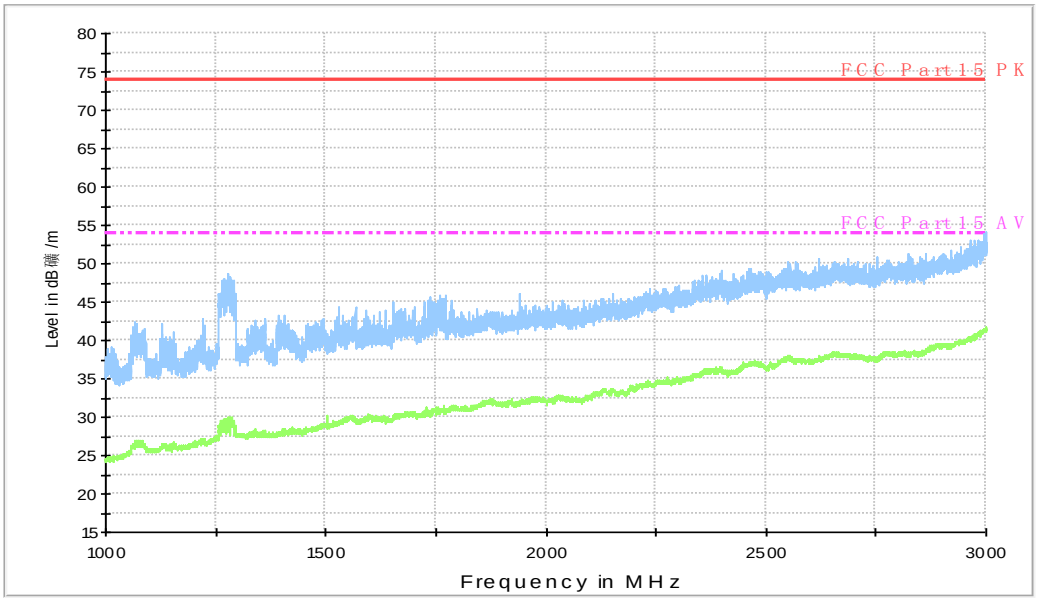

Figure A.11 Radiated Emission from 1GHz to 3GHz

15b RE - 3GHz-18GHz

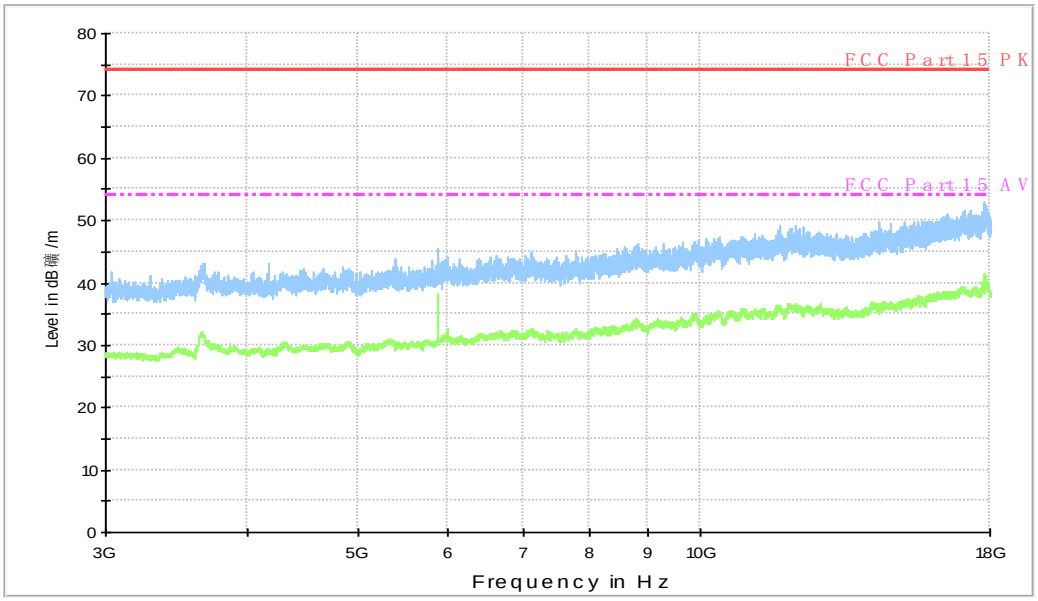

Figure A.12 Radiated Emission from 3GHz to 18GHz

USB Mode, Set.11

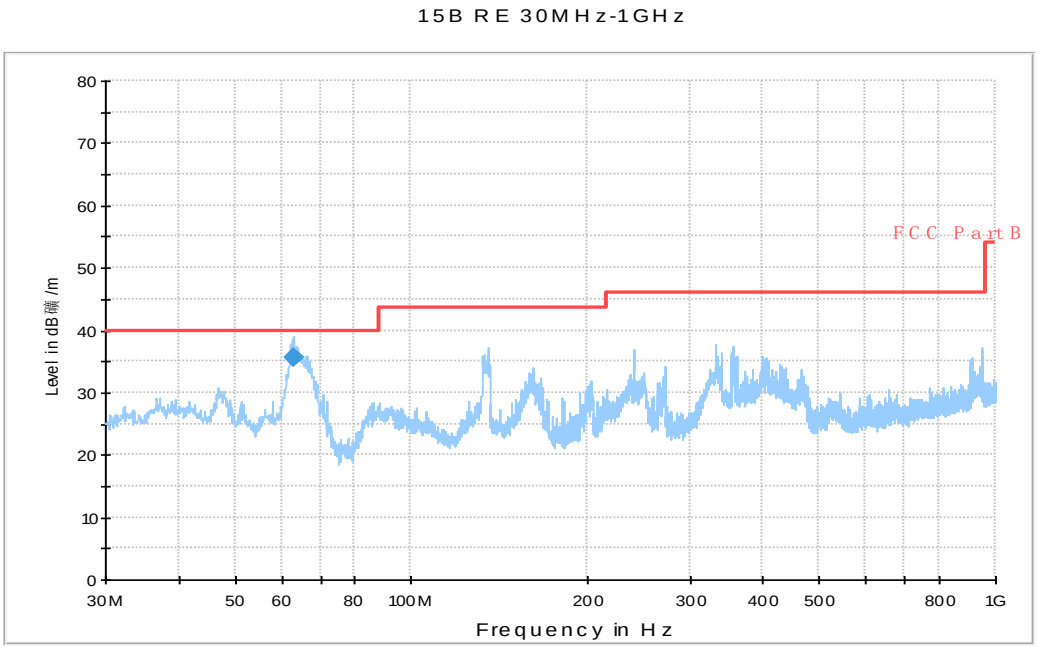

Figure A.13 Radiated Emission from 30MHz to 1GHz

Final Result 1

Frequency (MHz)	QuasiPeak (dBµV/m)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)
62.883000	35.6	100.0	V	310.0	-19.7	4.4	40.0

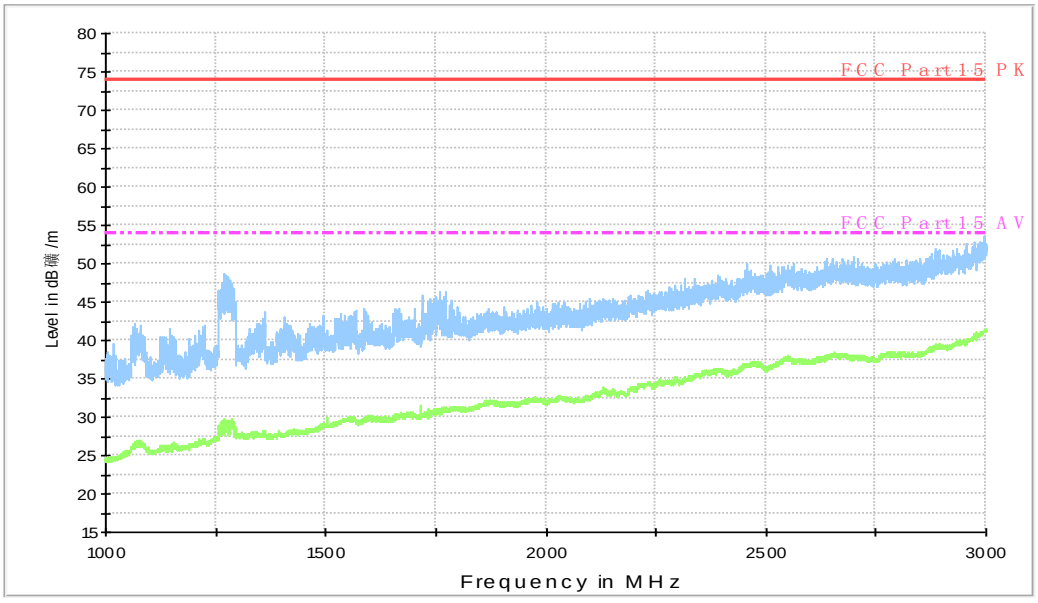

Figure A.14 Radiated Emission from 1GHz to 3GHz

15b RE - 3GHz-18GHz

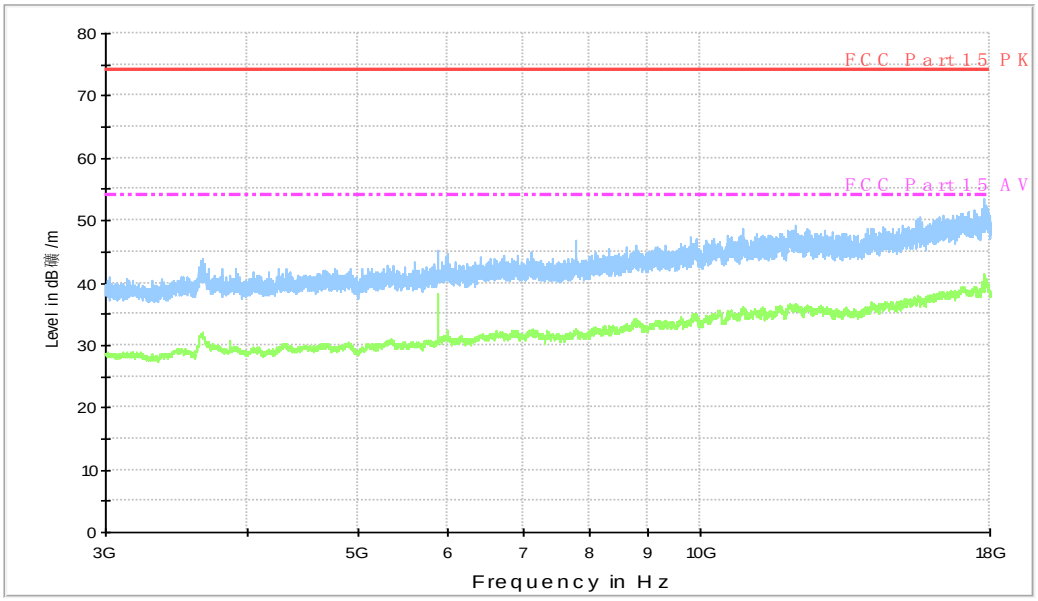

Figure A.15 Radiated Emission from 3GHz to 18GHz

A.2 Conducted Emission

Reference

FCC: CFR Part 15.107(a).

A.2.1 Method of measurement

For equipment that is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies within the band 150 kHz to 30 MHz shall not exceed the limits. Tested in accordance with the procedures of ANSI C63.4 – 2014, section 7.3.

A.2.2 EUT Operating Mode

The MS is operating in the charging mode. During the test MS is connected to a charger in the case of charging mode.

A.2.3 Measurement Limit

Frequency of emission (MHz)	Conducted limit (dBμV)	
	Quasi-peak	Average
0.15-0.5	66 to 56*	56 to 46*
0.5-5	56	46
5-30	60	50
*Decreases with the logarithm of the frequency		

A.2.4 Test Condition in charging mode

Voltage（V）	Frequency（Hz）
120	60

RBW/IF bandwidth	Sweep Time(s)
9kHz	1

A.2.5 Measurement Results

Measurement uncertainty: *U*= 3.38dB, *k*=2.

Charging Mode, Set.7

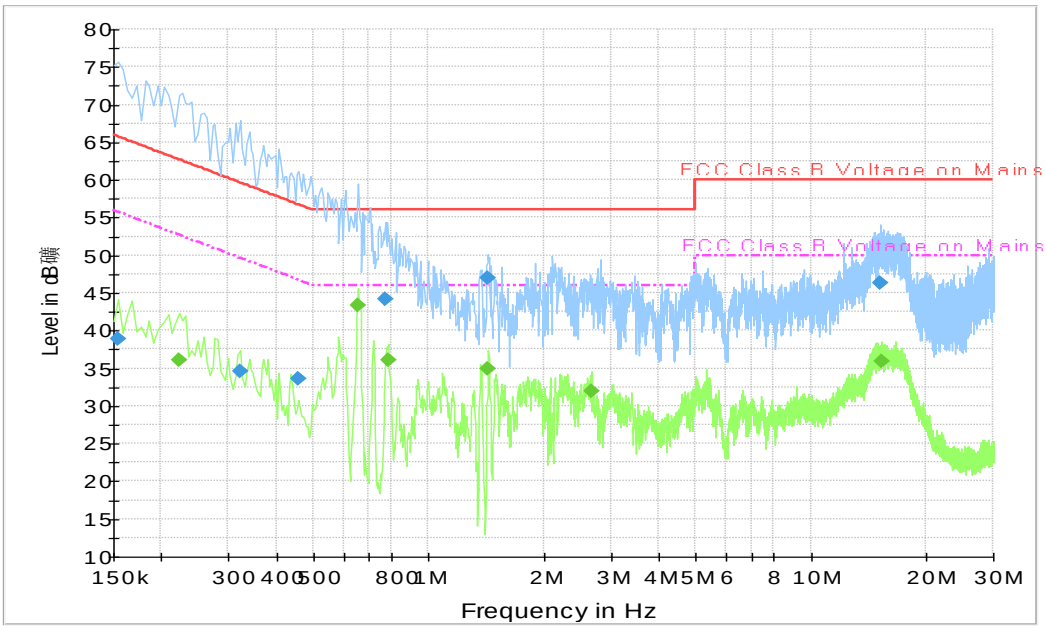

Figure A.16 Conducted Emission

Final Result 1

Frequency (MHz)	QuasiPeak (dBµV)	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.154500	38.9	L1	20.1	26.9	65.8
0.321000	34.7	L1	19.8	25.0	59.7
0.456000	33.6	L1	19.9	23.1	56.8
0.771000	44.2	L1	19.8	11.8	56.0
1.428000	47.0	L1	19.7	9.0	56.0
15.184500	46.3	L1	19.8	13.7	60.0

Final Result 2

Frequency (MHz)	CAverage (dBµV)	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.222000	36.1	L1	19.8	16.6	52.7
0.654000	43.3	L1	19.8	2.7	46.0
0.784500	36.0	L1	19.8	10.0	46.0
1.432500	34.9	L1	19.7	11.1	46.0
2.665500	31.9	L1	19.4	14.1	46.0
15.351000	35.8	L1	19.8	14.2	50.0

Charging Mode, Set.8

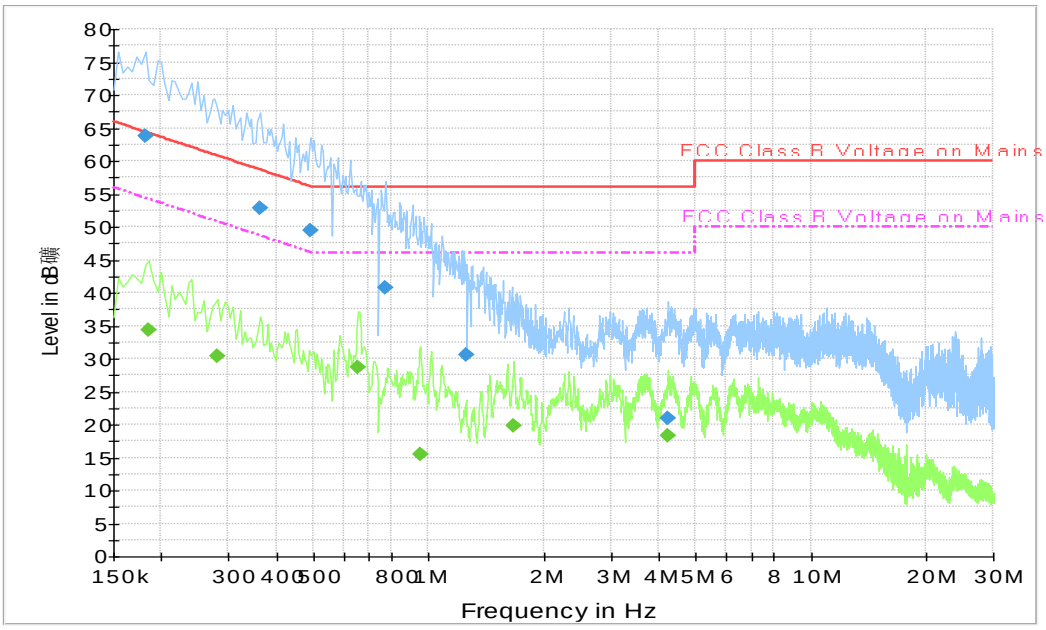

Figure A.17 Conducted Emission

Final Result 1

Frequency (MHz)	QuasiPeak (dBµV)	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.181500	63.8	L1	19.8	0.6	64.4
0.361500	52.8	N	19.8	5.9	58.7
0.492000	49.4	L1	19.9	6.7	56.1
0.771000	40.8	N	19.8	15.2	56.0
1.257000	30.5	N	19.7	25.5	56.0
4.222500	21.0	L1	19.6	35.0	56.0

Final Result 2

Frequency (MHz)	CAverage (dBµV)	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.186000	34.3	L1	19.8	19.9	54.2
0.280500	30.3	L1	19.8	20.5	50.8
0.654000	28.7	L1	19.8	17.3	46.0
0.951000	15.4	L1	19.8	30.6	46.0
1.671000	19.7	L1	19.7	26.3	46.0
4.218000	18.3	L1	19.6	27.7	46.0

Charging Mode, Set.9

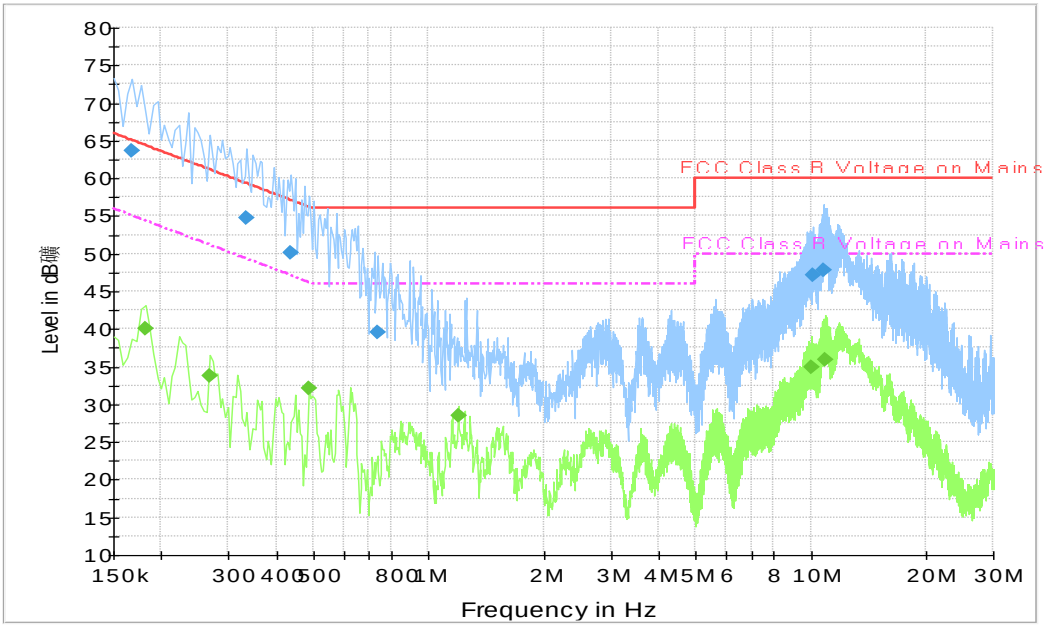

Figure A.18 Conducted Emission

Final Result 1

Frequency (MHz)	QuasiPeak (dBµV)	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.168000	63.6	N	19.9	1.4	65.1
0.334500	54.8	L1	19.9	4.5	59.3
0.438000	50.1	N	19.9	7.0	57.1
0.739500	39.6	N	19.8	16.4	56.0
10.140000	47.2	L1	19.7	12.8	60.0
10.828500	47.8	L1	19.7	12.2	60.0

Final Result 2

Frequency (MHz)	CAverage (dBµV)	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.181500	40.1	N	19.8	14.3	54.4
0.267000	33.7	L1	19.8	17.5	51.2
0.487500	32.2	N	19.9	14.1	46.2
1.194000	28.5	N	19.7	17.5	46.0
10.023000	34.9	L1	19.7	15.1	50.0
10.909500	35.9	L1	19.7	14.1	50.0

USB Mode, Set.10

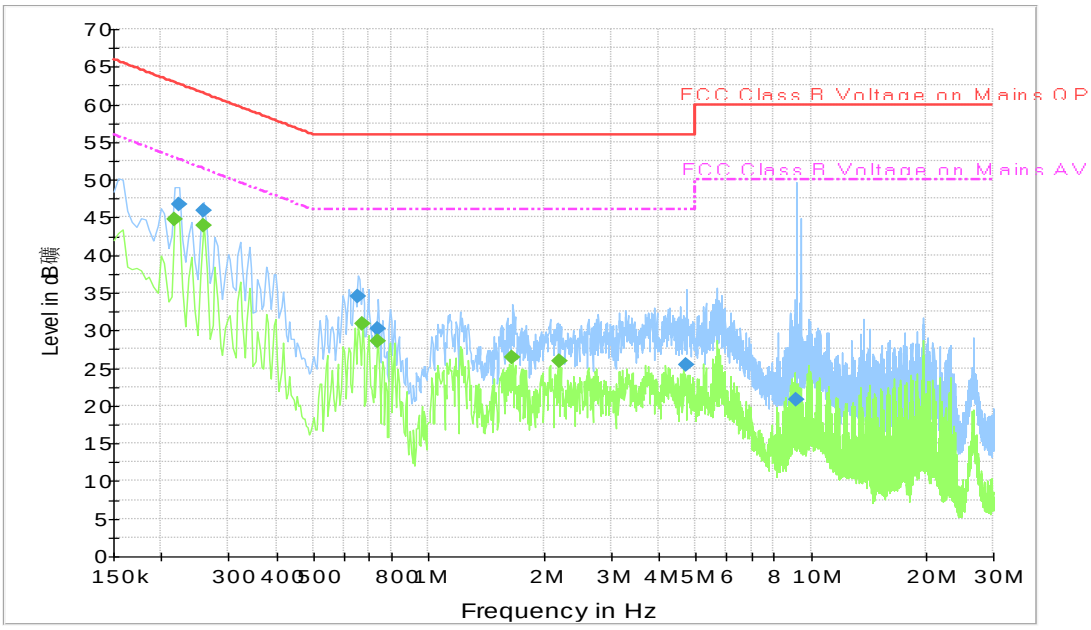

Figure A.19 Conducted Emission

Final Result 1

Frequency (MHz)	QuasiPeak (dBµV)	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.222000	46.7	N	19.8	16.0	62.7
0.258000	45.8	N	19.8	15.7	61.5
0.654000	34.5	N	19.8	21.5	56.0
0.739500	30.2	N	19.8	25.8	56.0
4.713000	25.5	L1	19.6	30.5	56.0
9.145500	20.8	N	19.7	39.2	60.0

Final Result 2

Frequency (MHz)	CAverage (dBµV)	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.217500	44.7	N	19.8	8.2	52.9
0.258000	43.9	N	19.8	7.6	51.5
0.672000	30.8	N	19.8	15.2	46.0
0.739500	28.6	N	19.8	17.4	46.0
1.657500	26.4	N	19.7	19.6	46.0
2.193000	25.9	L1	19.3	20.1	46.0

USB Mode, Set.11

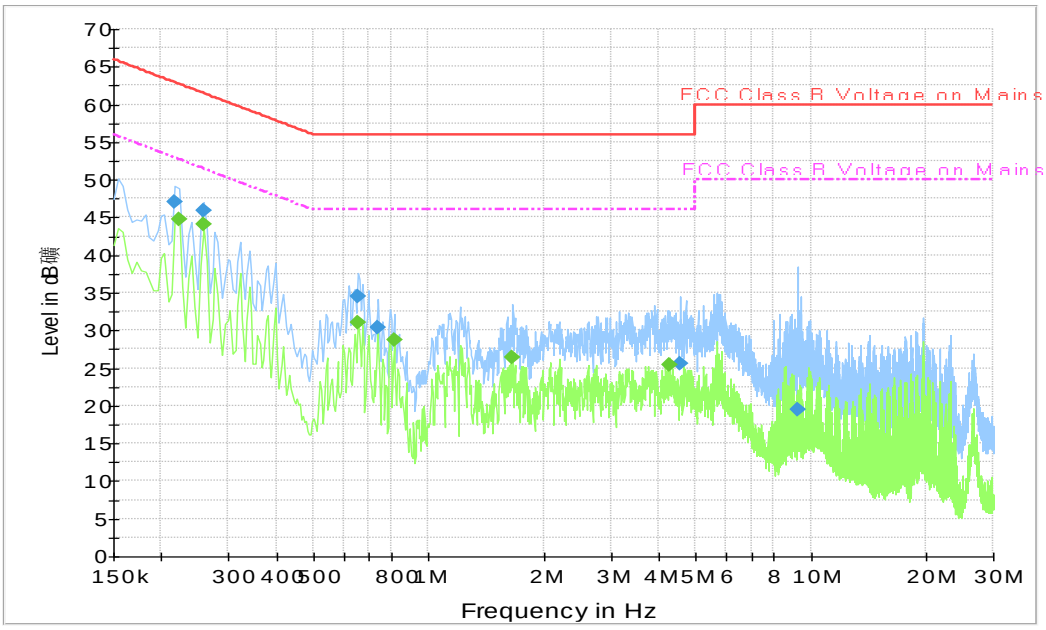

Figure A.20 Conducted Emission

Final Result 1

Frequency (MHz)	QuasiPeak (dBµV)	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.217500	47.0	N	19.8	15.9	62.9
0.258000	46.0	N	19.8	15.5	61.5
0.654000	34.6	N	19.8	21.4	56.0
0.739500	30.3	N	19.8	25.7	56.0
4.564500	25.6	L1	19.6	30.4	56.0
9.249000	19.4	N	19.7	40.6	60.0

Final Result 2

Frequency (MHz)	CAverage (dBµV)	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.222000	44.7	N	19.8	8.0	52.7
0.258000	44.0	N	19.8	7.5	51.5
0.654000	31.1	N	19.8	14.9	46.0
0.811500	28.7	N	19.8	17.3	46.0
1.657500	26.4	N	19.7	19.6	46.0
4.285500	25.4	N	19.6	20.6	46.0

*****END OF REPORT*****